Wetlands 101 Webinar Series

Part 4: Wetland Vegetation

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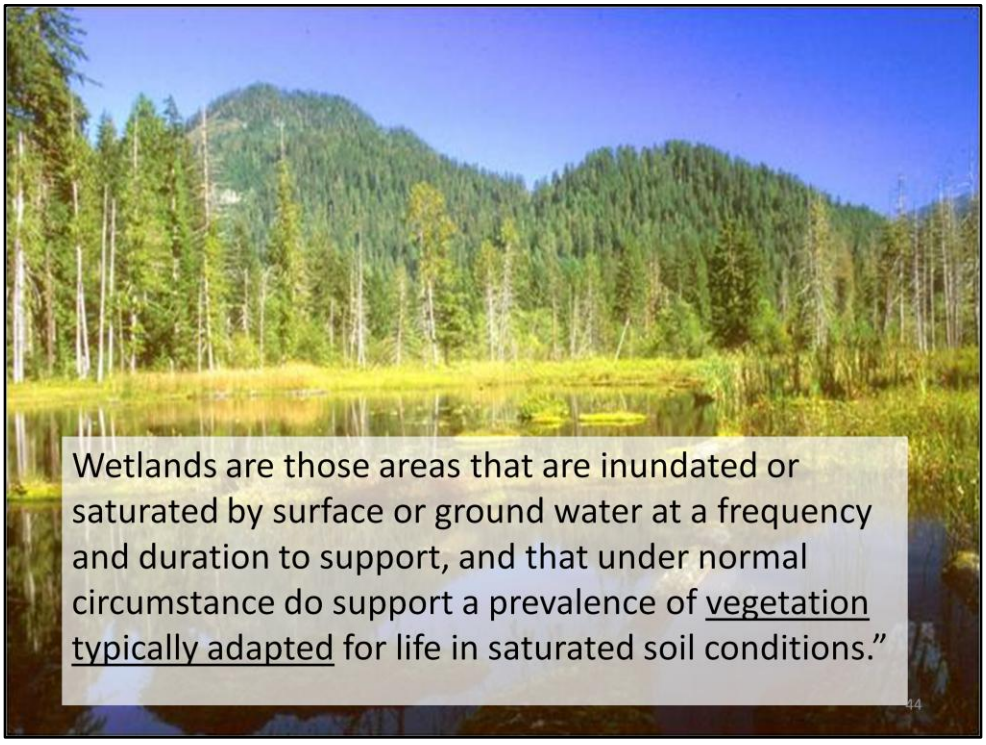
Hopefully you remember that a wetland has three components: water, soils, and vegetation. You have learned about the water and the soils. Now it is time to learn about the plants.

In this presentation I will focus on helping you to:
• Understand the term Hydrophytic Vegetation and how you know what plants are considered hydrophytic vegetation.

• Become familiar with some common wetland plants in some different wetland ecosystems so that you know or suspect when you might be in a wetland.

• Understand the hydrophytic vegetation indicators and the basic methods used to determine whether a plant community meets a **hydrophytic vegetation indicator** or, in other words, satisfies the vegetation criteria for a wetland delineation. We will also discuss how to check for or be aware of errors made in filling out the vegetation portion of the field data sheet.



Here is the wetland definition one more time… notice that I am focusing on the vegetation. "Vegetation typically adapted for life in saturated soil conditions? What does this mean? Well, this definition is referring to hydrophytic vegetation.

So what is Hydrophytic Vegetation? Basically, it is a plant or plants that occur in areas that are wet enough for long enough that it influences which species grow there. This is a simplified definition.

Hydrophytic vegetation is defined as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present.

Hydrophytic Vegetation, or Hydrophytes are plants that grow in water, soil, or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.
Basically, A plant that can tolerate water or soil that lacks oxygen and is therefore anaerobic at least in the upper part.
A WETLAND PLANT

Tolerance for occasional wetness is not sufficient; most plants can survive short periods of soil saturation, particularly during the dormant season.

Only specifically adapted plant species can survive prolonged soil saturation and anaerobic conditions during the growing season. Even then, plants vary in how much or how long they can tolerate water or lack of oxygen.

How do you know which plants are adapted to survive and thrive in saturated conditions?

Wetland Indicator Status

Indicator Category	Symbol	Definition/Occurrence in Wetlands
Obligate	OBL	Plants that almost always occur in wetlands; rarely found in uplands
Facultative Wetland	FACW	Plants that usually occur in wetlands but are occasionally found in uplands
Facultative	FAC	Plants that occur in either wetlands or uplands
Facultative Upland	FACU	Plants that occasionally occur wetlands but are usually found in uplands
Upland	UPL	Plants that almost never occur in wetlands; almost always found in uplands. 46

The level of tolerance to water or to a water-induced lack of oxygen in the root zone is represented in the WETLAND INDICATOR STATUS. Plant species are categorized by wetland indicator status, ranging from obligate wetland (OBL) meaning "plants that almost always occur in standing water or in saturated soils" to upland (UPL), meaning "Plants that almost never occur in water or saturated soils."

How was this determined? And by Whom?
The National Wetland Technical Committee based the Categories on best professional judgment of observed occurrence of a species in both wetlands and uplands. It is not based on scientific experimentation, which is why the definitions are subjective and not quantitative.

Where do you find the indicator status of a plant? The National Wetland Plant List, which is available on-line and is searchable.

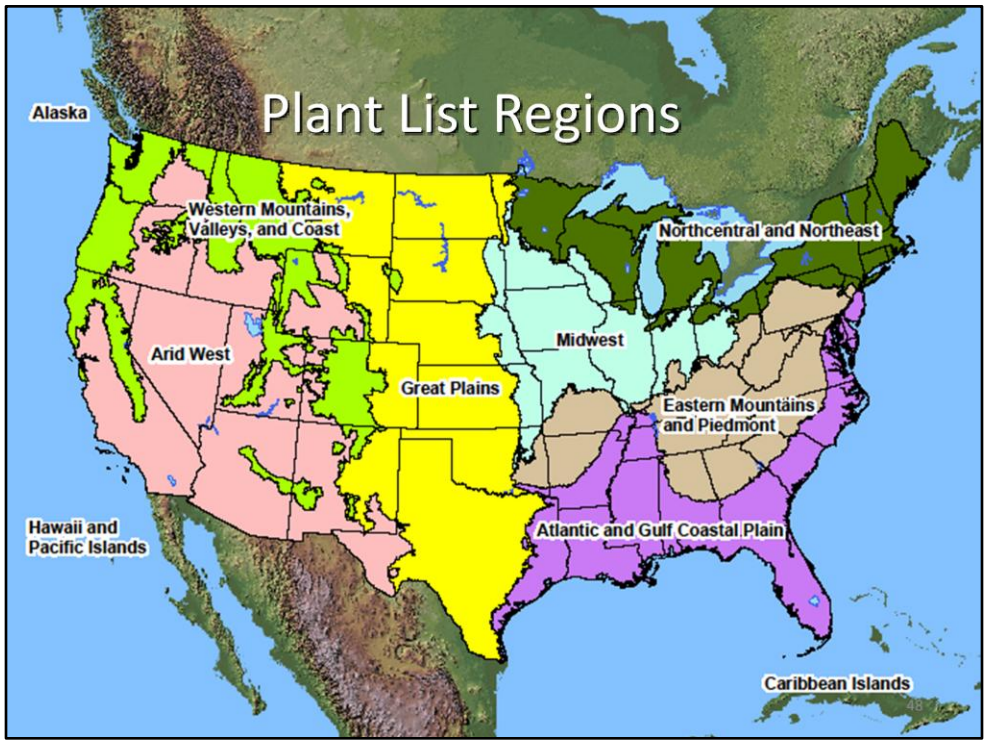
For wetland investigations, it is unnecessary to identify the adaptations of plant species found on a site. Instead, lists of plant species often found in wetlands have been compiled nationally and for each region of the US.

As of June 1, 2012 the National Wetland Plant List (NWPL) replaced the 1988 National List of Plant Species that Occur in Wetlands for use in Clean Water Act wetland delineations or determinations. Click on the “NWPL Pubs/Documents” in upper left corner for background on this process.

If you are reviewing a delineation report, make sure the author used the most recent version of the NWPL, and definitely not the 1988 National List of Plant Species that Occur in Wetlands.

The NWPL Plant List was Updated in 2014, and since 2012 it has been updated every year!

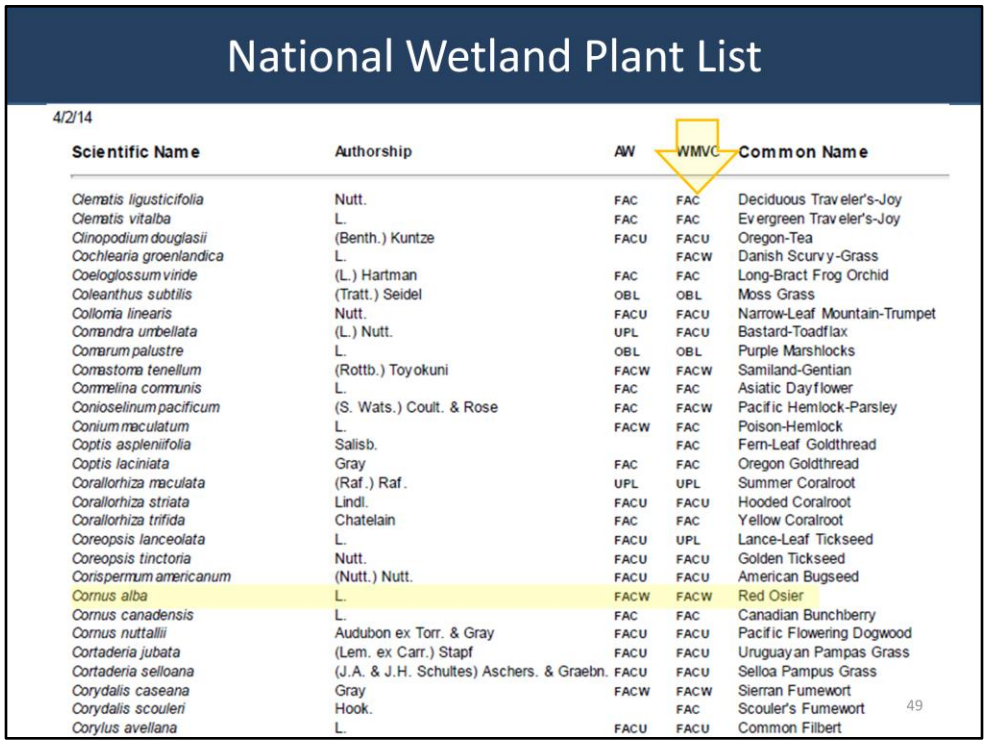
Be aware, the website can be slow to load.



Here is a Map of the plant list regions - They are the Same regions that are used for the Regional Supplements to the Corps Delineation Manual.

The Indicator status of a plant species is assigned at the regional level; therefore, a species may have a different indicator status in different regions. Red Alder, for example, has a facultative indicator status in the Western Mountains, Valleys, and Coast region and a facultative wetland indicator status in the Arid West region.

You can create plant lists by region. Or you can create plant lists by state, and there are separate columns for the indicator status of each species by region, for each region that occurs in that state.



National Wetland Plant List

4/2/14

Scientific Name	Authorship	AW	WMVC	Common Name
Clematis ligusticifolia	Nutt.	FAC	FAC	Deciduous Traveler's-Joy
Clematis vitalba	L.	FAC	FAC	Evergreen Traveler's-Joy
Clinopodium douglasii	(Benth.) Kuntze	FACU	FACU	Oregon-Tea
Cochlearia groenlandica	L.		FACW	Danish Scurvy-Grass
Coeloglossum viride	(L.) Hartman	FAC	FAC	Long-Bract Frog Orchid
Coleanthus subtilis	(Tratt.) Seidel	OBL	OBL	Moss Grass
Collomia linearis	Nutt.	FACU	FACU	Narrow-Leaf Mountain-Trumpet
Comandra umbellata	(L.) Nutt.	UPL	FACU	Bastard-Toadflax
Comarum palustre	L.	OBL	OBL	Purple Marshlocks
Comastoma tenellum	(Rottb.) Toyokuni	FACW	FACW	Samiland-Gentian
Commelina communis	L.	FAC	FAC	Asiatic Dayflower
Conioselinum pacificum	(S. Wats.) Coult. & Rose	FAC	FACW	Pacific Hemlock-Parsley
Conium maculatum	L.	FACW	FAC	Poison-Hemlock
Coptis aspleniifolia	Salisb.		FAC	Fern-Leaf Goldthread
Coptis laciniata	Gray	FAC	FAC	Oregon Goldthread
Corallorhiza maculata	(Raf.) Raf.	UPL	UPL	Summer Coralroot
Corallorhiza striata	Lindl.	FACU	FACU	Hooded Coralroot
Corallorhiza trifida	Chatelain	FAC	FAC	Yellow Coralroot
Coreopsis lanceolata	L.	FACU	UPL	Lance-Leaf Tickseed
Coreopsis tinctoria	Nutt.	FACU	FACU	Golden Tickseed
Corispermum americanum	(Nutt.) Nutt.	FACU	FACU	American Bugseed
Cornus alba	L.	FACW	FACW	Red Osier
Cornus canadensis	L.	FAC	FAC	Canadian Bunchberry
Cornus nuttallii	Audubon ex Torr. & Gray	FACU	FACU	Pacific Flowering Dogwood
Cortaderia jubata	(Lem. ex Carr.) Stapf	FACU	FACU	Uruguayan Pampas Grass
Cortaderia selloana	(J.A. & J.H. Schultes) Aschers. & Graebn.	FACU	FACU	Selloa Pampus Grass
Corydalis caseana	Gray	FACW	FACW	Sierran Fumewort
Corydalis scouleri	Hook.		FAC	Scouler's Fumewort
Corylus avellana	L.	FACU	FACU	Common Filbert

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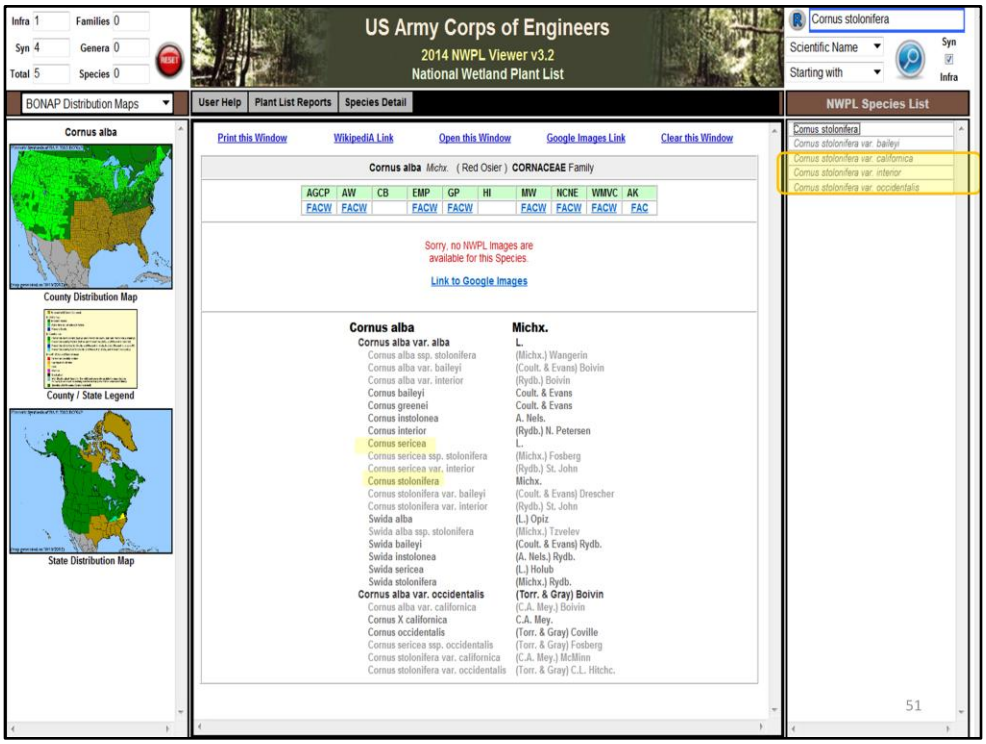
This is a sample from the 2014 plant list. The date in the upper left corner indicates the effective date of the update. Scientific name refers to Genus and species of the plant – these names may change as plant names so often do these days. AW refers to Arid West and WMVC refers to Western Mountains, Valleys, and Coasts. For western WA the indicator status in the WMVC column applies.

The common names used may not be the common names you are familiar with. For example, soft rush or Juncus effusus, which we will see photos of later, is a common plant of wet pastures. In this list it is called "Lamp Rush." Scientific names can change too. For example, the yellow highlight above, red osier – many of us know it as red osier dogwood. The scientific name given in Pacific Northwest field guides is Cornus stolonifera or Cornus sericea, neither of which is listed here. So what can you do if you do not see a plant name listed? Or if you are reviewing a wetland delineation report and a plant mentioned is not on this list or you are not familiar with the name of the plant species?

Try searching the National Wetland Plant List Viewer Tool

You can search for plant names, scientific and common. And look at the range of a species to check if it is the species you think it is.

Click on the Launch the NWPL Viewer Tool. It may take a while to load, so be patient.



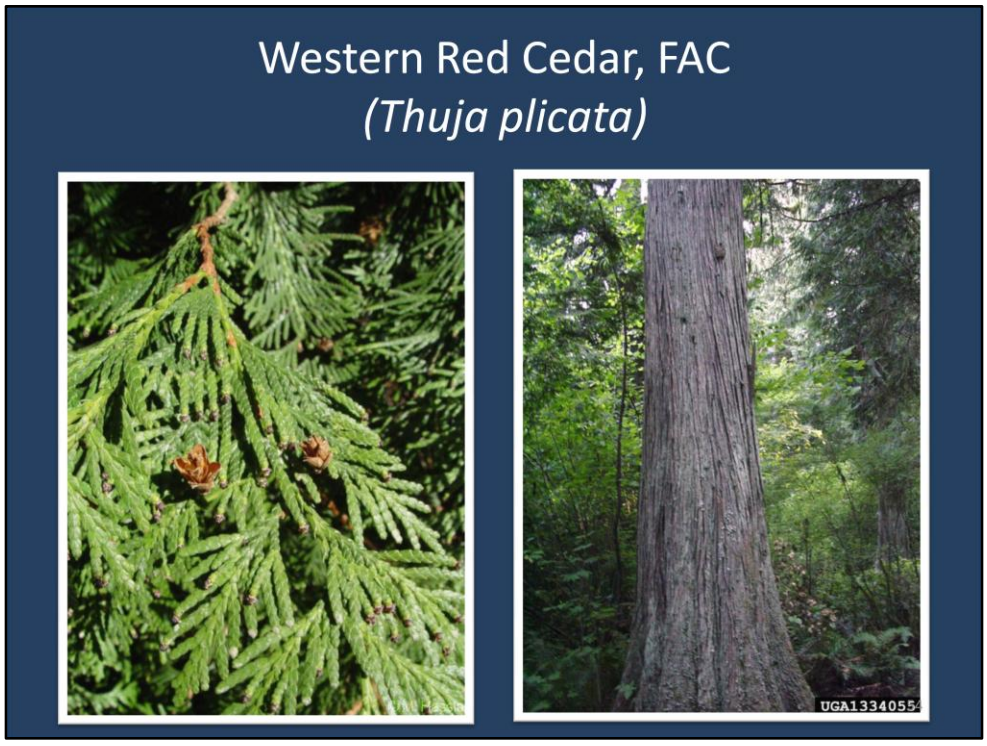
Use the search box in upper right hand corner of the site. Enter the scientific name that you are familiar with and then click on a name listed below, under NWPL Species List. In this example, Cornus stolonifera and all its varieties are subsumed within Cornus alba, so searching for Cornus stolonifera or Cornus sericea will automatically bring up Cornus alba. You can check to make sure this is the species you want by checking the range map at the left. The dark green indicates the species is present (and native) in the state, and the light green indicates the species is present (and native) in the county. For some species you may need to choose a specific subspecies or variety in order to get a match with the NWPL name.

In this case, if I search for Cornus alba it will bring up the same list in the center, which lets me know that Cornus alba includes the species I have known as Cornus stolonifera or Cornus sericea.

Before we move on to discuss some of the common wetland plants and their habitats, do you have any questions?

If you are familiar with some of the most common wetland plant species for the different wetland types of western Washington, it can help you to know or suspect when you may be in wetland or when a proposed project *is located in* wetland.

Coniferous forested wetlands have an overstory of tree species that also occur in upland forests, such as Cedar and Spruce. Understory species such as Skunk cabbage, which is an obligate wetland plant that grows in saturated organic soils, provides a good indication that wetlands may be present. Western hemlock, which is visible in the background, is a facultative upland species, but it is also a common species of coniferous forested wetlands and we'll talk more about that later.



It is a large, evergreen tree. Cedars are facultative species, meaning they can occur in wetlands or uplands. Cedars do not like to be in standing water.

Grows up to 180 feet tall. Has scale-like leaves, which are arranged as opposite pairs in 4 rows.
Fruits are small, egg-shaped cones

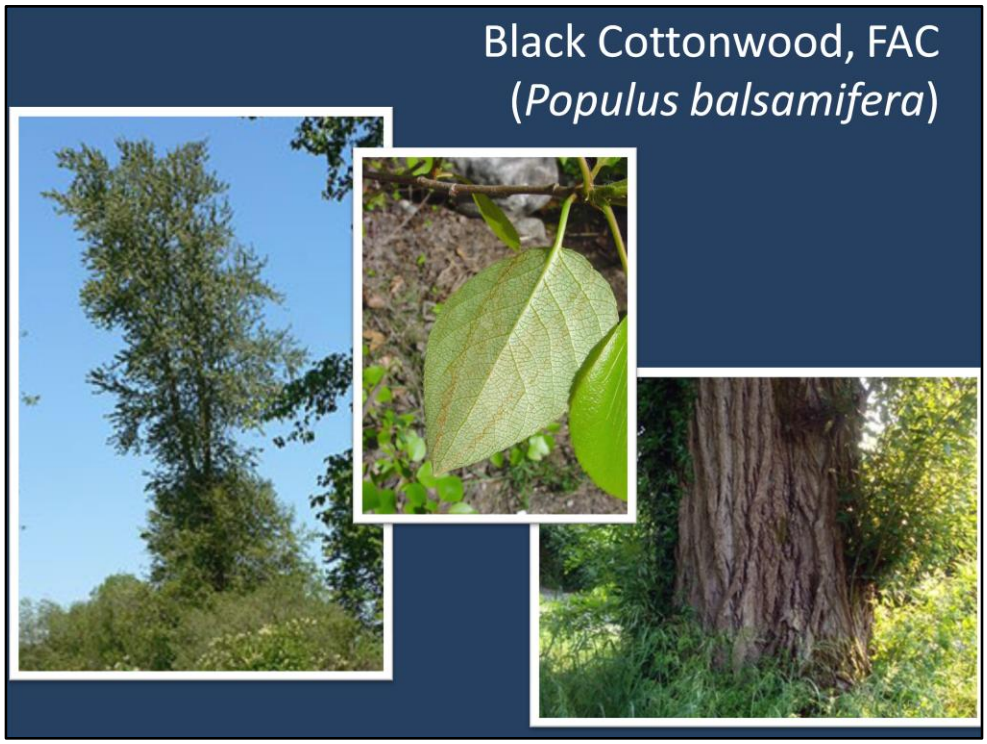
Sitka spruce is also an evergreen tree. Its most distinguishing feature is its sharp, needle like leaves. Do the touch test and you'll know if it is a spruce. Sitka spruce occurs in western forested wetlands, but it is a dominant tree of Coastal Forested Wetlands. It is a facultative species, so it can occur in wetlands or uplands.

Can become massive – up to 230' tall. Leaves are needle-like, stiff, sharp-pointed, and bluish-green. Fruits are drooping cones with papery scales.

Here is another forested wetland ecosystem type. This deciduous forested wetland is dominated by Oregon Ash and Slough Sedge. Slough sedge is another obligate wetland species that provides a good indication that wetlands may be present.

Oregon Ash is a deciduous tree. Oregon ash is a facultative wetland species, meaning it usually occurs in wetlands. In fact Oregon ash often grows in areas that are inundated in early part of the growing season, as in this photos.

Medium-sized tree up to about 70 feet tall. Its twig & leaves are opposite. Its leaves are pinnate with 5-7 leaflets. It has “Canoe paddle” or “banana bunch” fruits.
The trunks have furrowed bark.



ommon in riparian areas, floodplains, and bottomland forests.

eeds are covered in white fluffy hairs that look like “snow”. Leaf buds have a fragrant resin that perfumes the air around them in early spring.

Lady Fern, FAC (*Athyrium filix-femina*)

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Lady fern is an herbaceous plant made up of clustered fronds that are shaped like a diamonds. This tapering at both ends is its distinguishing feature.

Lady fern is common in the understory of forested wetlands and along the upper edges of ponds. It is facultative so it can occur in wetlands or uplands.

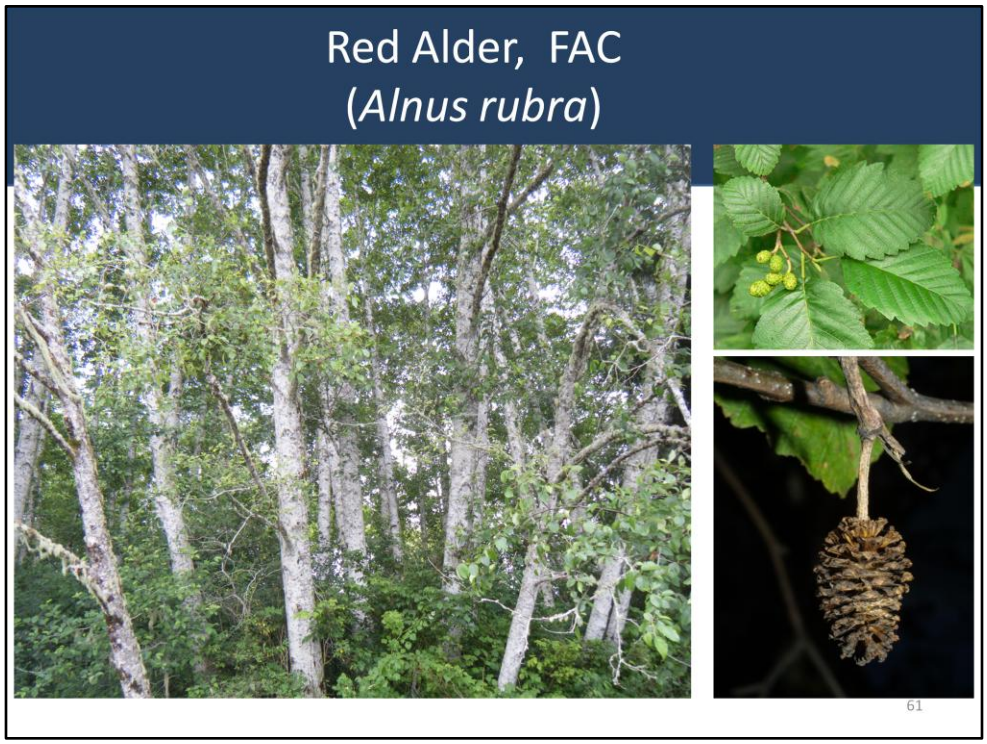
Grows from 3-7 feet tall. Fronds are 2-3 times pinnate, meaning there are leaflets on leaflets on leaflets.

Stems, and are scaly at the base.

Forested Wetlands

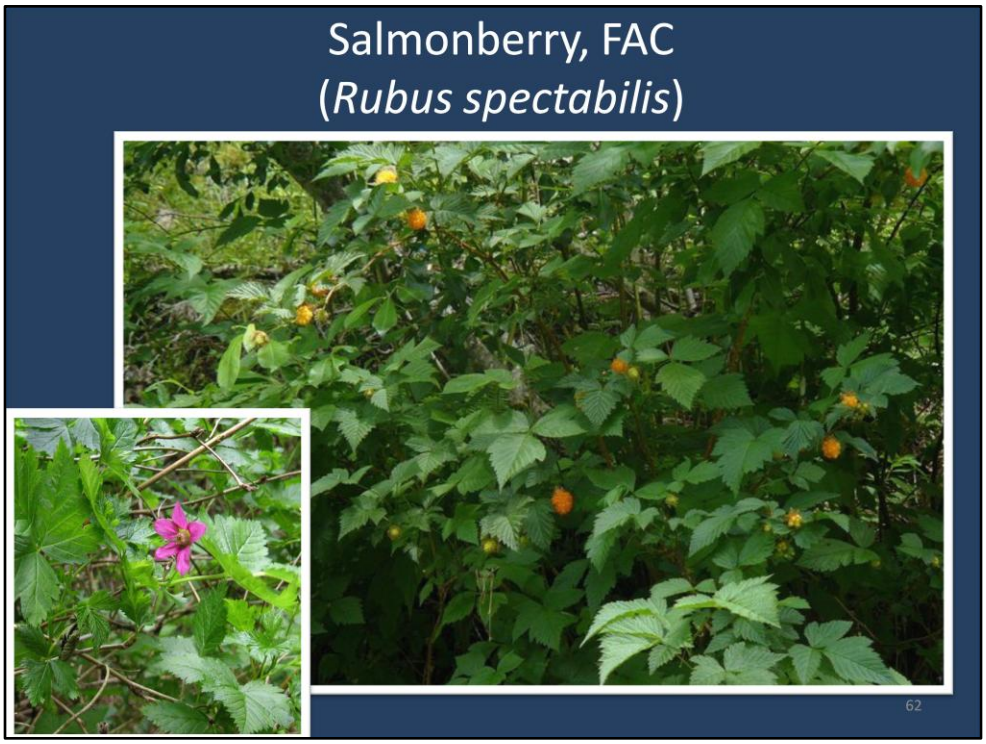
Image © 2004, Ben Legler

Here is another forested wetland typed, Red alder and salmonberry forests are very common in western Washington. Both species can occur in wetlands and uplands.



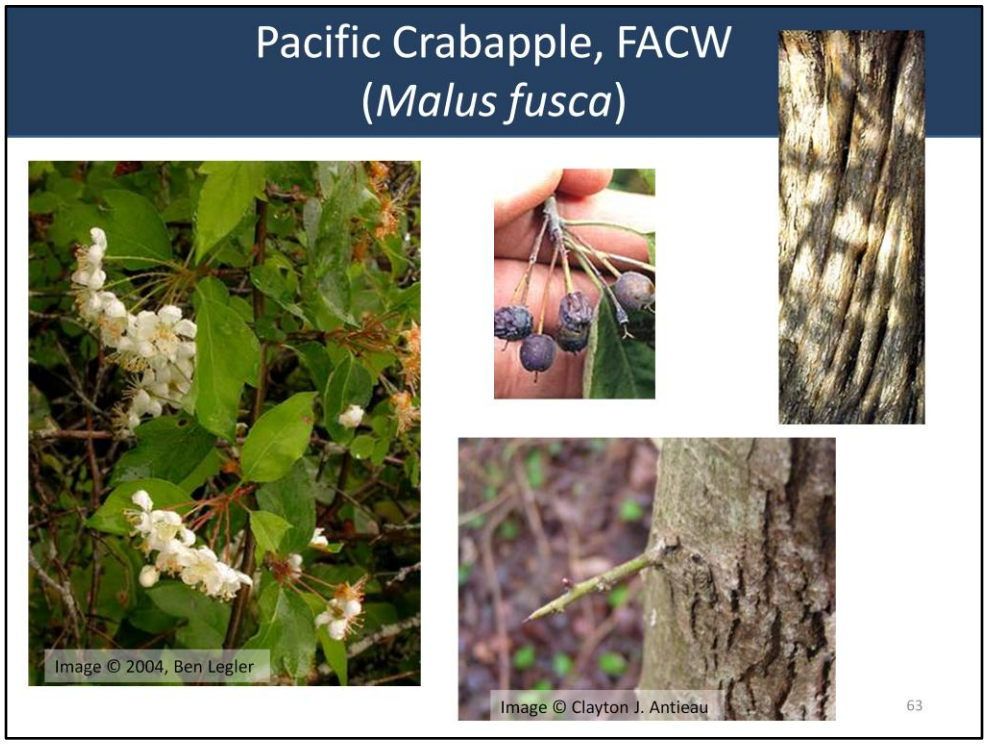
Red alder is a medium-sized deciduous tree. It is an early colonizer of disturbed soils and occurs in wide range of habitats. This “cone” in lower right photo generally persists on the tree throughout winter and make it easy to identify alders even if winter.

Grows up to 75 feet tall. Bark is grey, smooth, and frequently covered w/ lichens which make the bark appear white. Leaves are alternate with toothed or lobed margins. Fruit is conelike, green when immature, but dark brown when mature.



Salmonberry is a Deciduous understory shrub with variably thorny twigs and trunk. It is common in riparian and wetland areas, but it can occur in wetlands or uplands.

Grows up to 7 ft tall. Leaves are alternate, deciduous, and compound - usually with three leaflets.
Pink flowers which appear in early spring. Fruit is yellowish orange to dark red, with variable flavor.

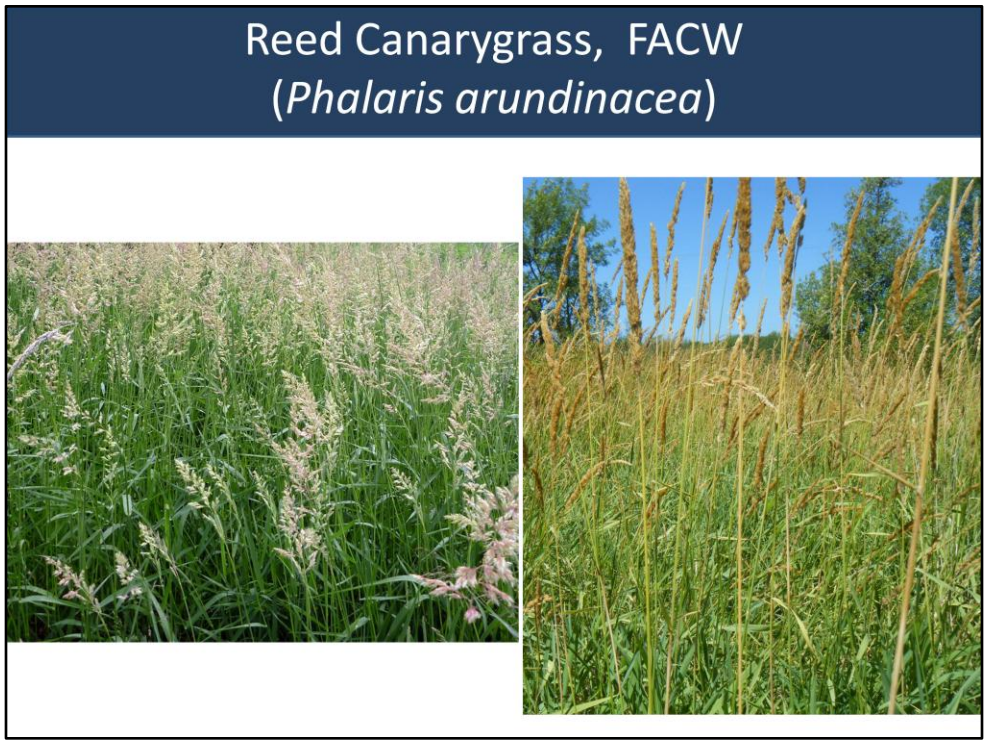


Pacific crabapple is a Shrub or small tree. Distinguishing feature is its highly variable leaves. The image shows that some leaves come to a single point others have one lobe on the side like a mitten others have two lobes on either side.

Grows up to 40 feet. Leaves are alternate, toothed, and highly variable in shape. Fruits are small, cherry-shaped, ripening yellow or red. It has showy, fragrant flower blooms. Its Branches may have stems which feel and appear like thorns.

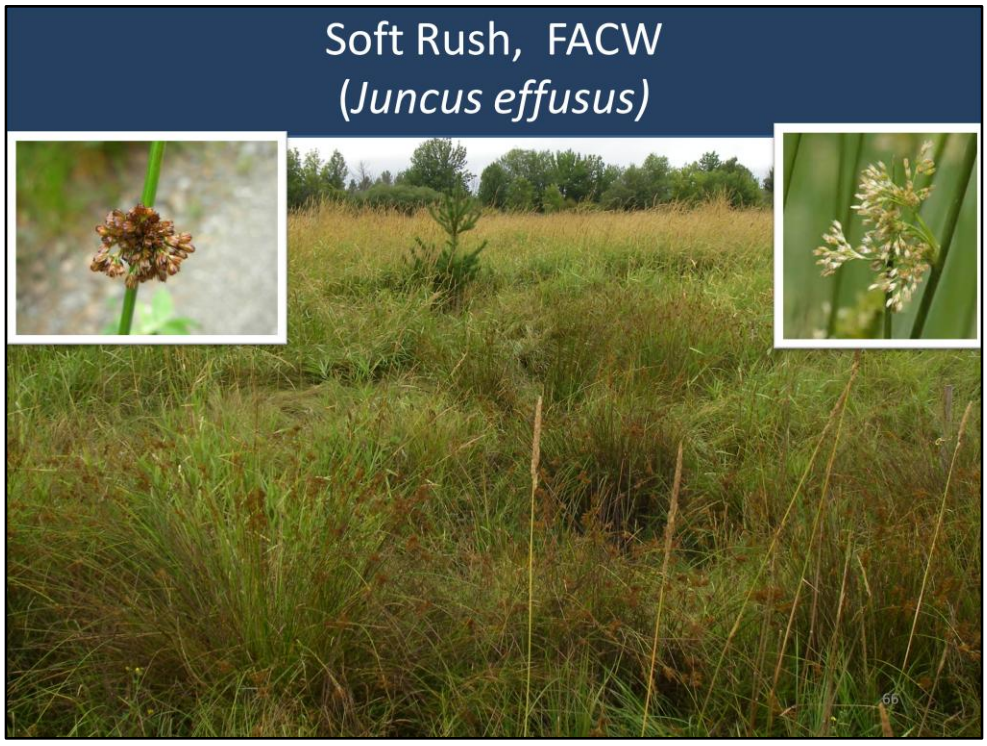
Wet pastures or fields. These wetlands may be highly modified and are among the most challenging to identify. The plants are typically introduced grasses. Grasses are difficult to identify, particularly if they are not in flower or fruit. In this example it appears to be soft rush and meadow foxtail.

In some cases the wetland is limited to wet areas or swales running through a field, in other cases the whole field is wet.



Reed canarygrass is a very common and invasive wetland grass. It is facultative wetland so it usually occurs in wetlands.
It is rhizomatous and mat forming, which contributes to what I think is its most distinguishing feature - it typically forms a monoculture, which can often follow the boundary of the wetland.

It has large leaf blades and can grow to 6 feet tall. It has bluish-green leaves early in the growing season turning straw-colored later in the season and into winter.
When in flower the branches of the inflorescence are open and spreading, when mature these branches contract to become tight and narrow.



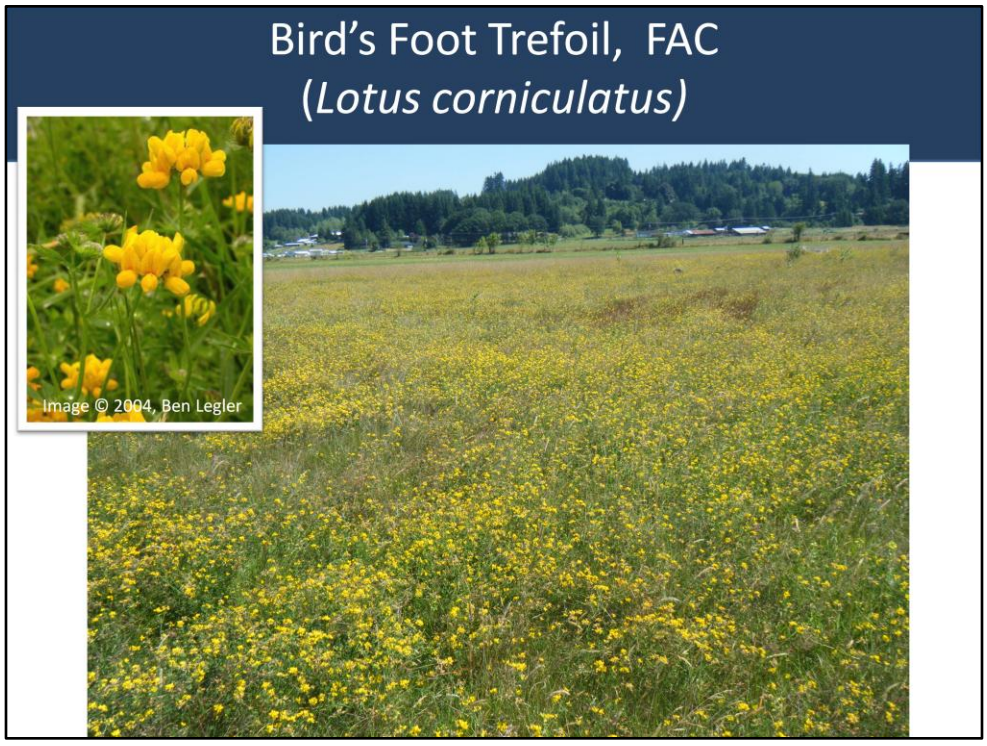
Juncus effusus is also facultative wetland, and it is usually found in wetlands. Juncus effusus is a rush that forms large clumps. These clumps are its most distinguishing feature.

Grows up to 3 feet tall. Old stems persisit around the base in winter and early spring. Stems are round and without any leaf blades. Inflorescence can be highly variable, from a tight clump to a spreading panicle.
FYI - Reed canarygrass is in the background.

Meadow foxtail was introduced as a pasture grass, so it is very common in wet pastures. It is very distinctive when flowering because the inflorescence is cylindrical and fuzzy and looks like a hairy little cigar. Meadow foxtail is facultative so it can grow in wetland or uplands.

Other species of Alopecurus/foxtail that you are likely to see are OBL wetland species. A. geniculatus and A. aequalis will typically start growing in standing water, such as a ditch. Both of these are much smaller, more prostrate, and less erect.

It can grow up to 5 feet tall.



Bird's foot trefoil is a creeping and generally low growing herb, but when flowering its stems can become erect. Its flowers are most distinguishing feature; they are yellow and pea-like. It is facultative so it can grow in wetlands or uplands.

Grows up to 2 feet tall. Its leaves are alternate, pinnately compound, with 5 leaflets. The fruits are narrow pods.

Buttercup, FAC (*Ranunculus repens and R. acris*)

Creeping buttercup, *R.repens*

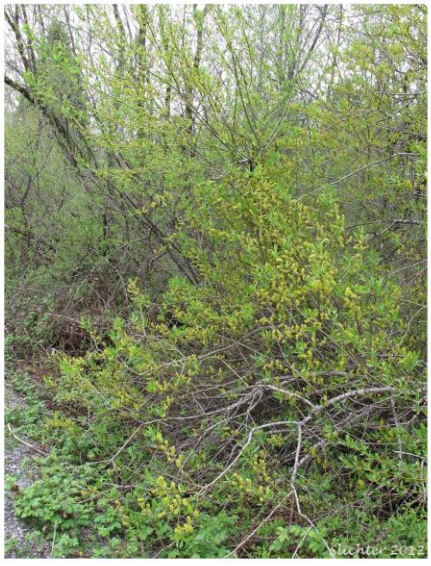
Tall buttercup, *R.acris* 69

These two buttercups are both perennial herbs that are facultative plants and can occur in wetlands or uplands.
Ranunculus repens (at left) is creeping buttercup. It is low-growing and may form a dense carpet.
Ranunculus acris (at right) is tall buttercup. It is erect or "tall"

Both - Flowers are yellow, 5-petaled, and glossy.
Creeping buttercup leaves are compound as tri-lobed leaflets, which may have light markings.
Tall buttercup leaves are palmately divided and finely dissected. Grows up to 3 ft. tall.

Shrub wetlands are typically found along the edges of ponds or in swallow depressions that are wet through the winter and into the spring. They can be very dense and almost impenetrable to walk through. Willows are the most common species in these habitats, and the common willows of Western Washington are all facultative or wetter.

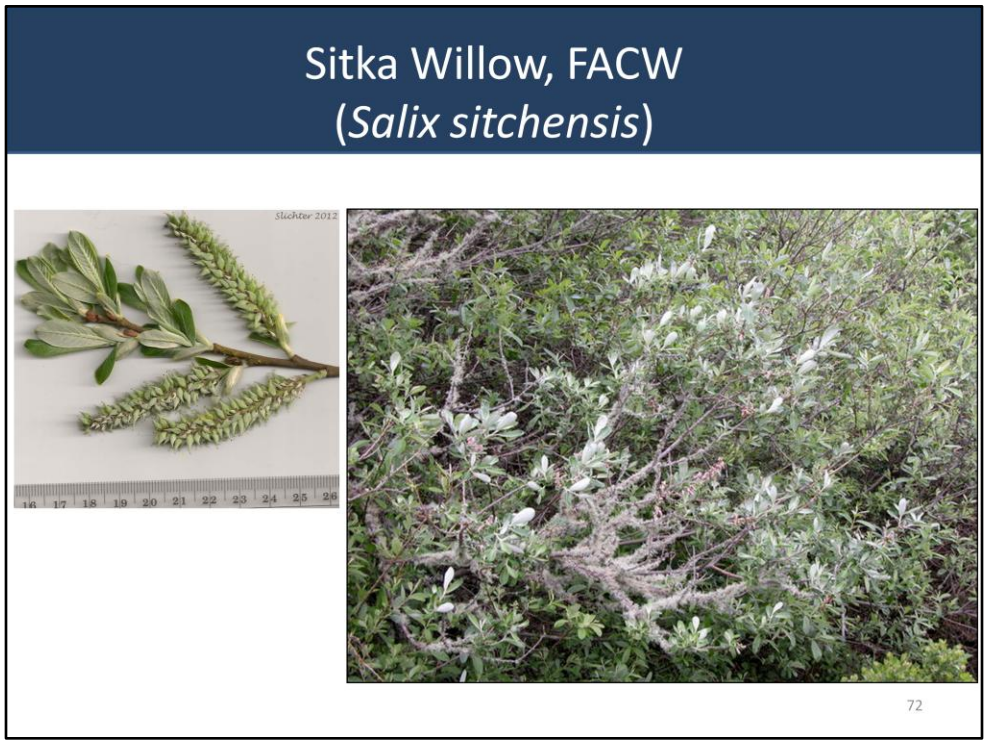
Pacific Willow, FACW
(*Salix lasiandra*)



Pacific willow is one of the most common willows. It is a deciduous shrub or multi-stemmed tree. Pacific willow is facultative wetland meaning that it usually grows in wetlands.
Its distinguishing features are its long leaves that narrow to a point, and its catkins which bear both flowers and fruits. These catkins are distinctive of willows generally.

Willows are unisexual meaning that one plant is male (with male catkins) and another plant is female (with female catkins).

Grows up to 60 feet tall. Leaves are alternate, lance-shaped, and tapering to a sharp point.



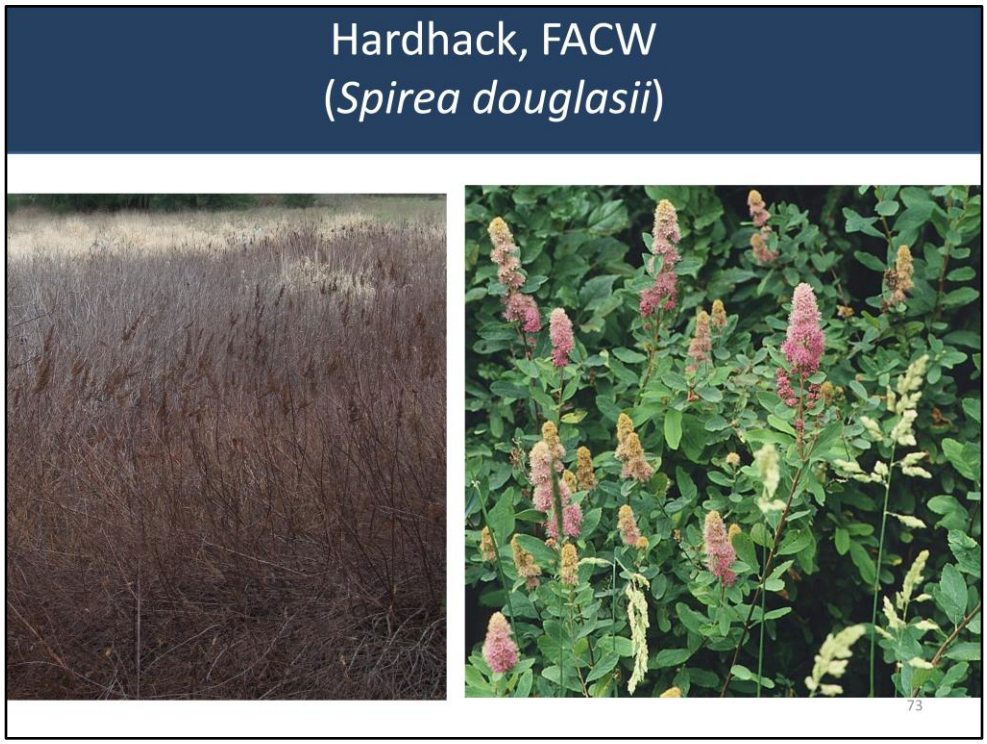
Sitka willow is another of the most common willows. Its most distinguishing feature is the underside of its leaves, which have short, dense hairs that are almost velvety. These hairs reflect light when rotated, such that one side will appear light and the other dark. When tilted it will switch.

There is also Hooker's willow, which is typically found near salt water. Its young leaves and twigs are fuzzy, but once they are mature the underside of the leaves usually have a white waxy coating that you can rub off.

Both Sitka and Hookers willow are facultative wetland meaning that they usually grows in wetlands.

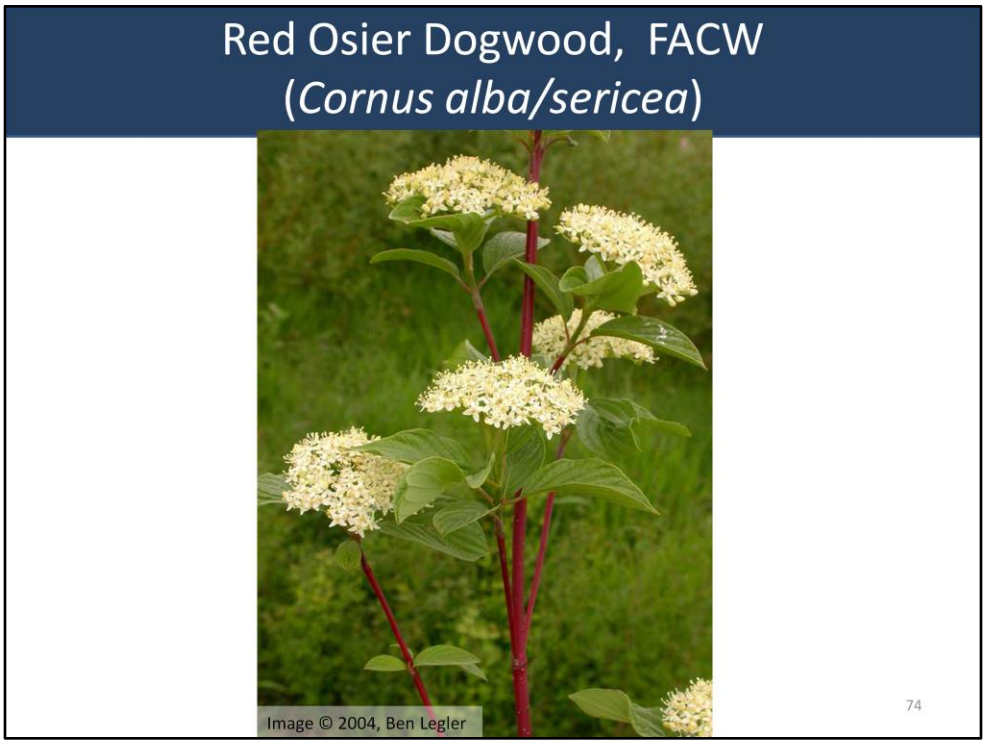
Sitka willow is a deciduous, multi-stemmed shrub that can grow up to 25 feet tall. Flowers and fruits are in catkins

Its Leaves are alternate. The plants are unisexual like pacific willow.



Spirea is a very common leggy, thicket-forming shrub. Its distinguishing feature is that is generally grows in a monoculture.
Spirea is facultative wetland so it is usually found in wetlands.

Grows up to 7 feet tall. It has alternate, deciduous, toothed leaves, that are paler and sometimes woolly beneath.
The fruits are pod-like follicles which remain after the leaves have fallen, as visible in the photo at left.



Red osier dogwood is a deciduous shrub that has red stems and branches, which are a very distinctive feature, especially in winter. Its trunk and older branches have lenticels, which look like whitish-gray spots. It is FACW so it usually grows in wetlands.

Its leaves and branches are opposite, and the leaves are simple, entire, and have very prominent veins. In fall the leaves typically turn reddish. Its white cluster of flowers in spring, matures into white berries in summer.

Nootka rose, pictured here has the same indicator status and occurs in very similar habitats to pear-fruit rose (*R.pisocarpa*), Both are FACultative.
Nootka rose typically has a single large pink flower that turns into a fruit, known as a hip, which is borne at the branch tip. Pear-fruit , also called clustered rose, typically has several flowers.

They are deciduous shrubs which can grow up to 10 feet tall. Their leaves are alternate, pinnate, with 5-7 leaflets.
They have thorns that are paired at the leaf base, otherwise they are generally thornless.

These depressional wetlands are unique to the outer coast of Washington (and Oregon). Interdunal wetlands are typically linear and parallel to the coastline. Those wetlands located closest to the ocean generally have less vegetation structure, dominated mostly by slough sedge (*Carex obnupta*).

Interdunal wetlands show greater diversity in vegetation as they occur further away from the wind and water forces of the ocean. Sitka spruce is dominant in the forested wetlands furthest from the ocean. Hookers willow is a dominant shrub in the wetlands in between.

Interdunal wetlands should not be confused with estuarine wetlands, which are tidally influenced by salt water.

Shore Pine, FAC (*Pinus contorta sp. contorta*)

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Shore pine is another dominant species in this coastal zone. It begins to colonize the secondary dunes, both wetland and uplands.

Typically a small, gnarly, evergreen tree with needle-like leaves that come in bundles of 2. Fruit is a brown, lopsided cone with a spine on the tip of the scales.

Wax myrtle is a facultative wetland species, meaning it usually occurs in wetlands.

Evergreen shrub to small tree, with shiny leaves and serrated leaf edges. Dark purplish berry like fruit.

Estuarine wetlands, also called salt marshes, contain plant species that are not only adapted to live in saturated soil conditions, but are also adapted to saline, or high salt, conditions. The following are all salt-tolerant wetland species. If any of the following species are listed in a wetland report or field data sheet, or if you observe any of them on a site visit, it is very likely that the proposed project site involves an estuarine wetland or coastal lagoon. Contact the Ecology Wetland Specialist for that area if you have questions or need assistance.

Pickleweed, OBL
(Salicornia depressa)

Also known as saltwort.

Seaside Arrowgrass, OBL
(Triglochin maritima)

Crushed leaves and stems smell like cilantro.

Fleshy, succulent, erect, perennial herb that grows to over 3 ft. tall. Leaves are basal and triangular. Flowers are tiny, greenish or purplish and clustered along the upper half of the flowering stem.

Very common, perennial coastal grass - low growing and mat forming.

Bogs and Fens are wetlands that have acidic soils that are primarily composed of peats or other organic materials. Trees within bogs and fens will often appear stunted, possibly with yellowish leaves.

Due to the unusual water chemistry, bogs and fens exhibit an unique flora. These ecosystems are Category I wetlands. They are relatively rare in the landscape and may contain endangered or threatened plant species.

All of the following species are obligate wetland and generally only occur in bogs or fens. If any of the following species are listed in a wetland report or field data sheet, or if you observe any of them on a site visit, it is very likely that the proposed project site involves a bog or fen. Contact the Ecology Wetland Specialist for that area if you have questions or need assistance.

Labrador tea is an obligate species, so it almost always occurs in wetlands.

Labrador tea is an evergreen shrub that can grow up to 7 feet tall. Its leaves are olive green and have rusty colored hairs on the undersides. Flowers are whitish and densely clustered. Fruits are oval, hairy, woody capsules. Plants are aromatic when crushed.

Sweetgale, OBL
(Myrica gale)

Image © 2004, Ben Legler

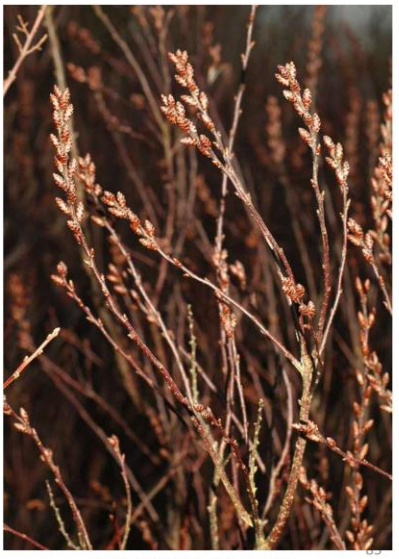


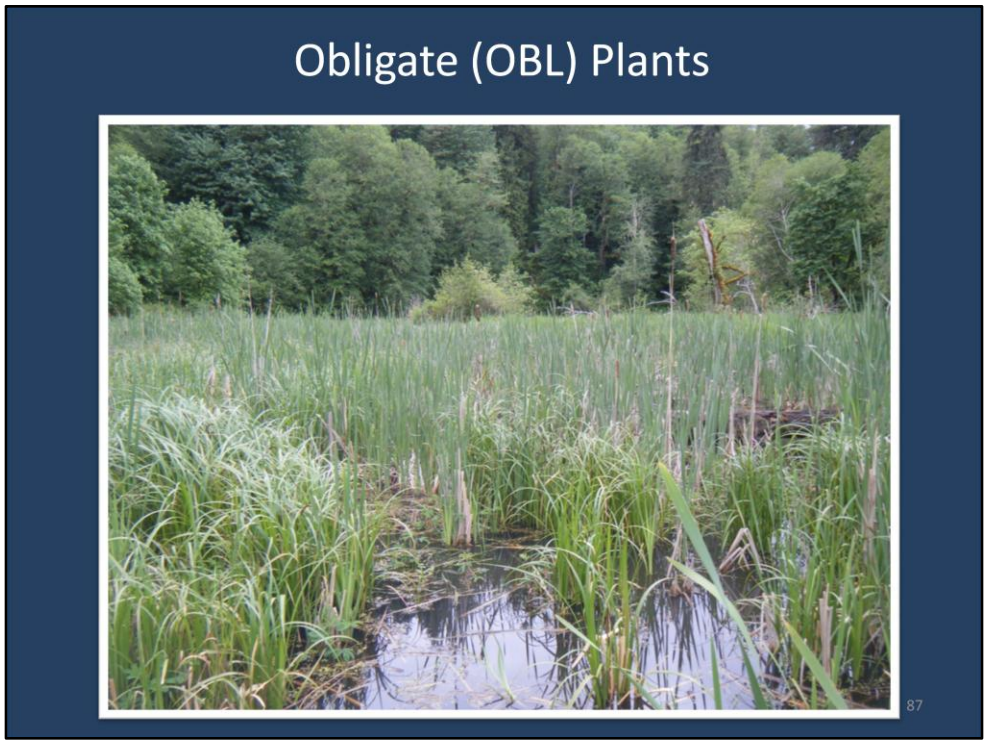
Image © 2006, Ben Legler

Sweetgale, Also an obligate wetland species.

It is a deciduous shrub that grows up to 6 feet tall. Its Leaves have tiny yellow glands on the underside.
Winter twigs have buds alternating around the stem, and the buds themselves have many overlapping scales. It looks almost like an immature pine cone.

Another obligate species.

Bog laurel is a small evergreen shrub that may form intertangled mats. It is generally less than 3 feet tall. Its leaves are dark green with a white midstripe. The leaf margins typically curl under. The flowers are relatively large, bright pink, and saucer-shaped. The fruits are woody, round capsules.



It can be easy to identify a wetland when it is full of water. But in Western Washington most wetlands and ponds dry up or draw down substantially by late summer. There are some plants that are generally only found in wetlands or areas that used to be wetlands. These are good plants to know because if you see them while doing a site visit, regardless of the type of ecosystem, it is a good bet there is at least some wetland present, or wetland used to be present recently. I like to think of the OBL as Obviously a wetland plant.

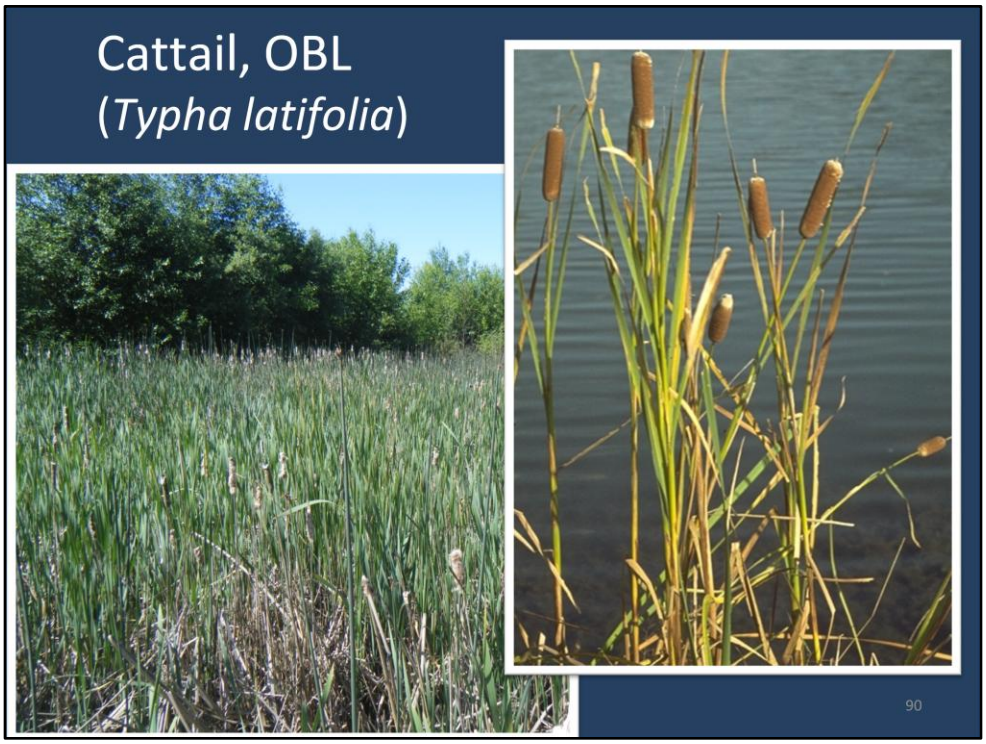
Skunk Cabbage, OBL
(*Lysichiton americanus*)

Skunk cabbage is an obligate wetland plant which typically grows in the understory of forested/shrub wetlands in organic soils.

It is a perennial herb with shiny/waxy leaves that are arranged in a basal rosette. The leaves are often greater than 3 feet long. It is one of the first plants to emerge in the spring and has been called swamp lantern. It has yellow, smelly flowers, hence the name “skunk.” The fruits are berries which are green to reddish.

There are many sedges in Western Washington. Most are hydrophytes. Either obligate or FAC wet. What are sedges? They look a lot like grasses, but most sedge stems are triangular, rather than round. Hence the phrase, "sedges have edges."

The sedge in this photo is *Carex obnupta* – slough sedge. It is a very common sedge – found in a wide variety of wetlands, under forest cover, interdunal wetlands on the coast, pastures or meadows. It grows in tufts 2-5 ft tall. Its flower spikes are dark brown, long and drooping and persistent, meaning that last year's flower spikes are present through the winter and early spring.

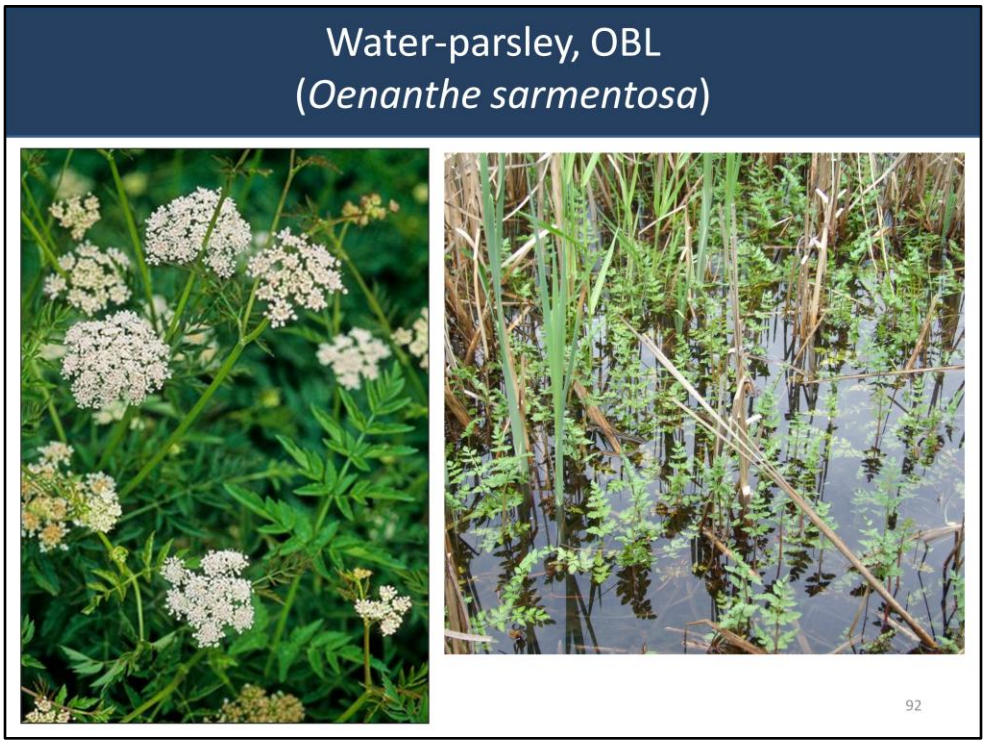


Hopefully cattail is a common enough species that you are all familiar with it. It typically grows in standing water, such as ponds and stormwater facilities.

Hardstem Bulrush, OBL (*Schoenoplectus acutus*)

Bulrush, also called Tule is an herbaceous perennial that grows from 3-10 ft tall. It generally grows in standing water in ponds and along the edges of slow moving streams.

The stems are gray-green, round, and thick. The flower spikelets are at the end of the stem.



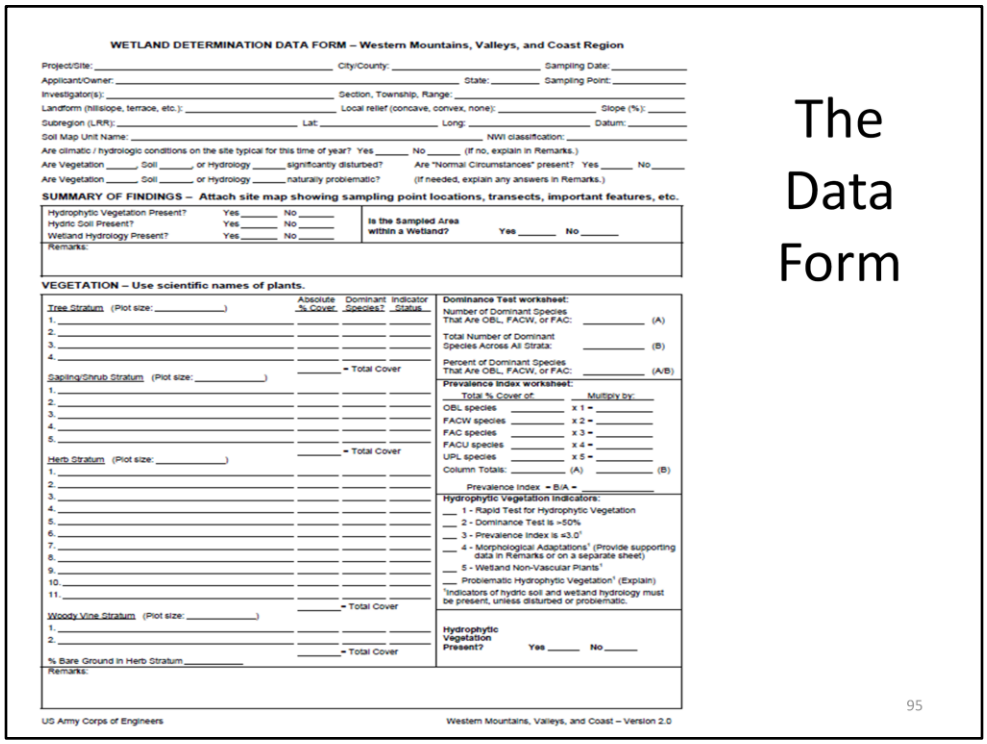
Water parsley is a Semi-aquatic Perennial herb. It grows densely, in water, in a variety of habitats.

Its leaves are double pinnately compound, meaning that there are leaflets on leaflets.

The flowers are white umbels, and the fruits are tiny ribbed barrels.

There are several species of spikerush in Western Washington. They are all obligate. Eleocharis palustris is the largest and probably the most commonly seen spikerush. It is a perennial herb that grows to 3 feet tall. It looks like a green leafless, round stem. The brownish flower spike appears at the tip of this stem. Common spikerush is rhizomatous and, though stems appear single, it can form a carpet in marshes and shallow ponds.

Before we take questions, I would like to mention a couple of things in case you would like more information on identifying plants:
First, the Wetland Resources document, which you will be emailed after this webinar has concluded, contains a list of plant field guides and dichotomous keys that are helpful;
Second, the Coastal Training Program offers classes on tree and shrub identification and classes on grass, sedge, and rush identification.
Now, are there any questions before we move on to the Field data form?



WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
Applicant/Owner: _____ State: _____ Sampling Point: _____
Investigator(s): _____ Section, Township, Range: _____
Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____
Soil Map Unit Name: _____ NWI classification: _____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____
Hydric Soil Present? Yes _____ No _____
Wetland Hydrology Present? Yes _____ No _____
Is the Sampled Area within a Wetland? Yes _____ No _____
Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____
Remarks:

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)
Total Number of Dominant Species Across All Strata: _____ (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)
[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No _____

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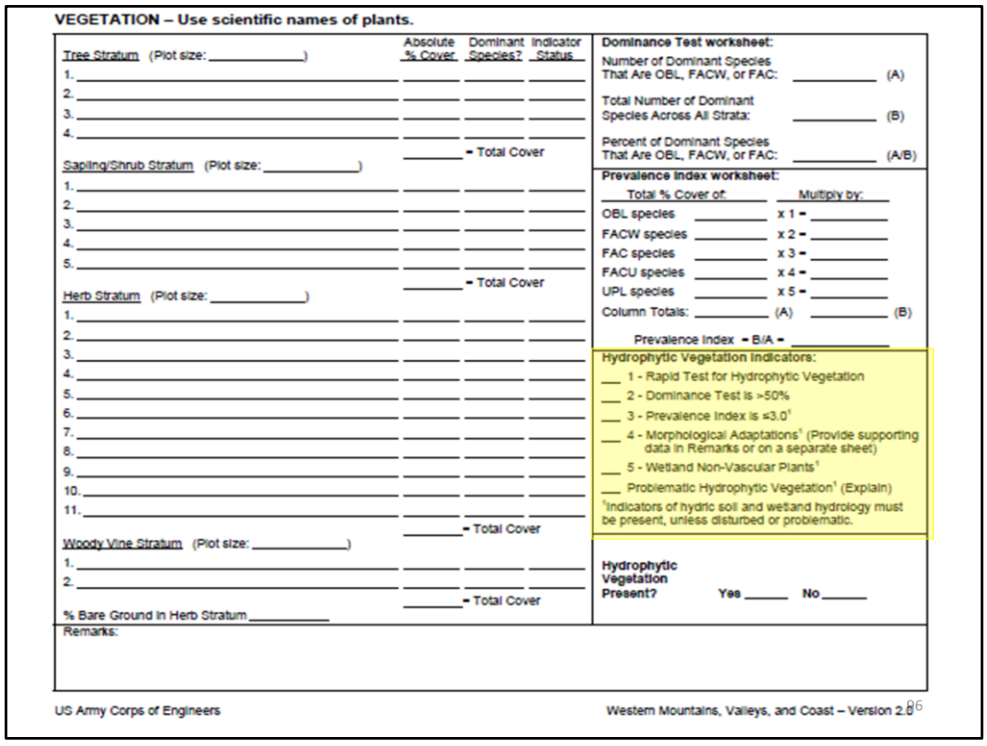
Now that you are familiar with some common wetland plants, which can help you identify wetlands in the field or wetland boundary errors, I am going to discuss the field data form so that you are familiar with the hydrophytic vegetation indicators and how they should be applied.



VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: _____)			
1. _____			
2. _____			
3. _____			
4. _____			
= Total Cover			
Sapling/Shrub Stratum (Plot size: _____)			
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
= Total Cover			
Herb Stratum (Plot size: _____)			
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			
7. _____			
8. _____			
9. _____			
10. _____			
11. _____			
= Total Cover			
Woody Vine Stratum (Plot size: _____)			
1. _____			
2. _____			
= Total Cover			
% Bare Ground in Herb Stratum _____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No _____

Remarks:

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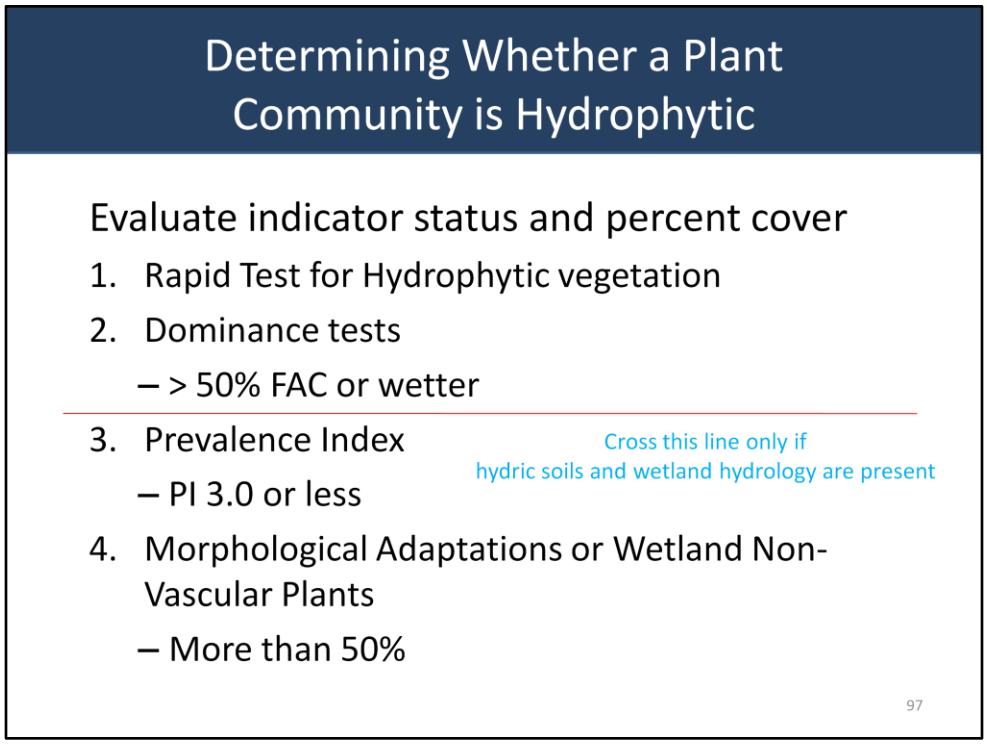
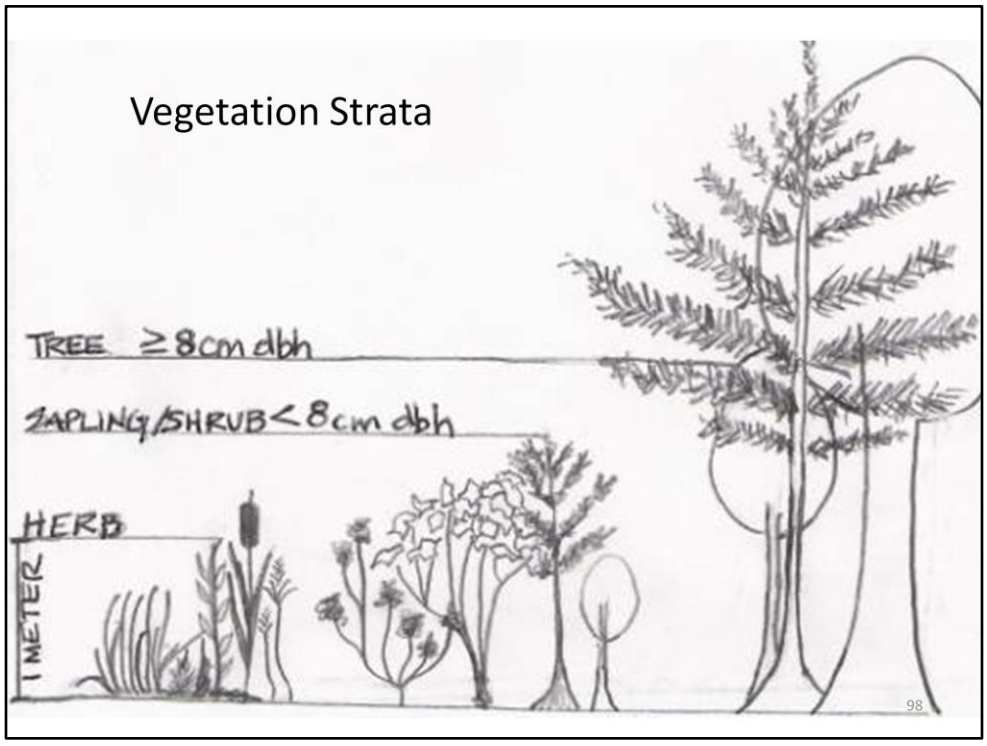
Hydrophytic Vegetation Indicators are highlighted yellow. There are 5, but only one of these needs to be met, unlike the hydrology and hydric soils where you mark any and all that apply.



Hydrophytic vegetation indicators are intended to be gone through in sequence.

For #1: the rapid test for hydrophytic vegetation is met if ALL the dominant species in ALL strata (meaning trees, shrubs, herbs, and vines) are either OBL or FACW. It is used as a quick confirmation in obvious cases, based on visual assessment rather than collection of quantitative data. The dominant species that meet this test need to be written on the data sheet.

If it meets the Rapid Test then the plot has met the hydrophytic vegetation indicator. And, by the way, it will also meet the FAC neutral hydrological indicator that Patrick mentioned last week.
If not, move on to #2.



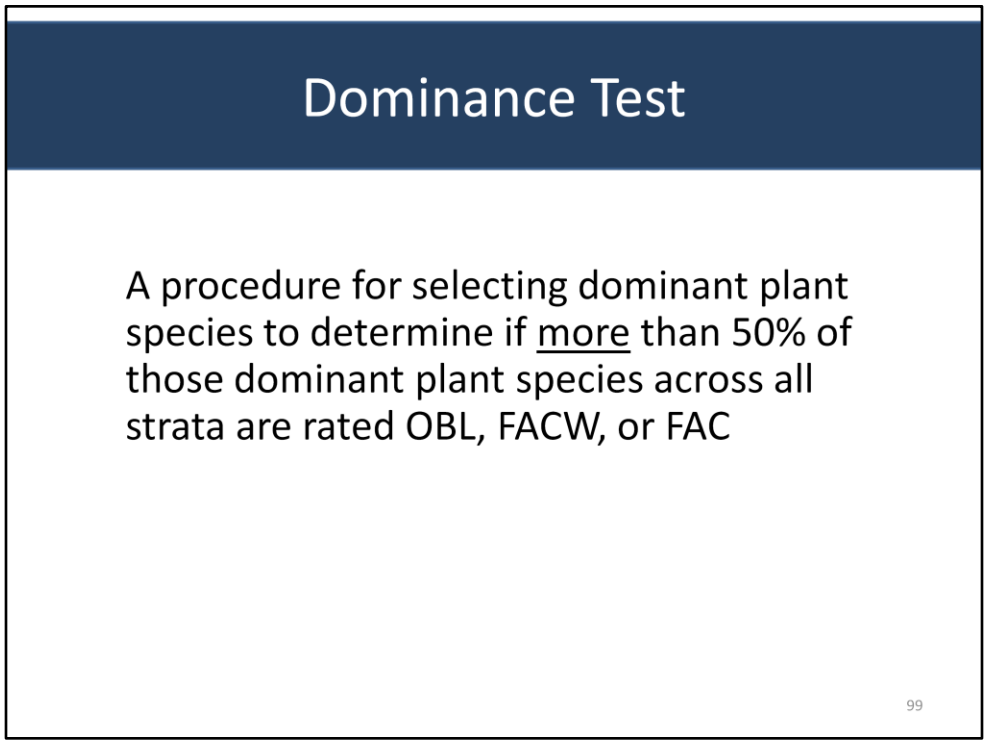
When you hear or read about vegetation strata, which is the plural form of stratum, it refers to different categories of plants. In the case of the field data form it is the different categories of plants present within the area being sampled.

Tree stratum – Consists of woody plants 3 in. (about 8 cm) or more in diameter at breast height (DBH), regardless of height.

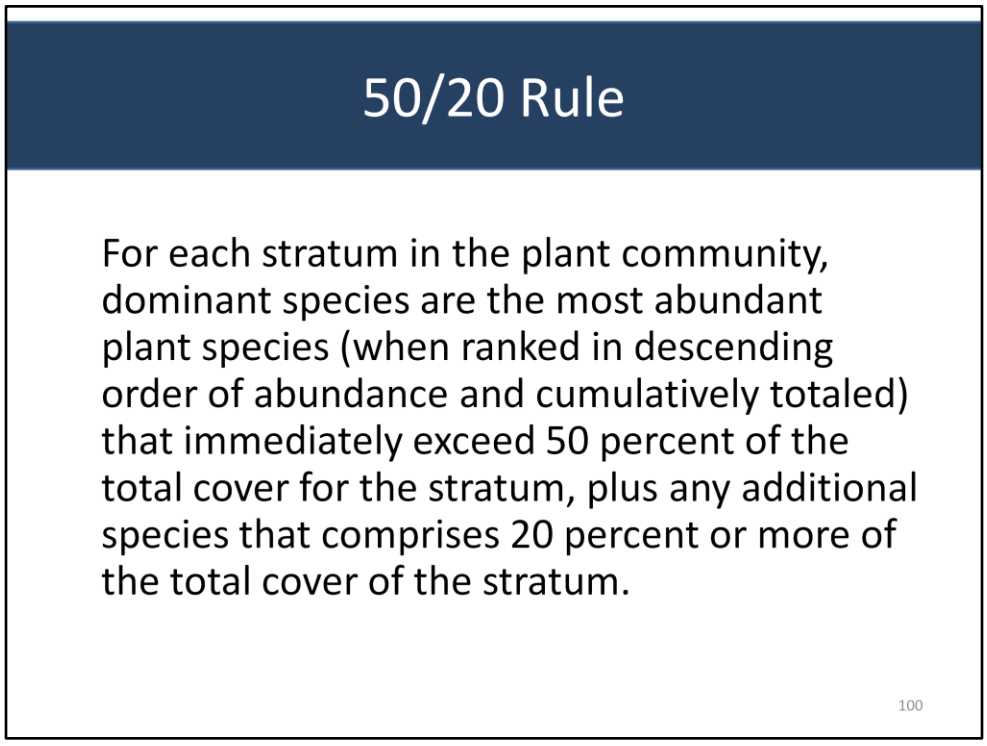
Sapling/shrub stratum – Consists of woody plants less than 3 in. DBH, regardless of height.

Herb stratum – Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size.

Woody vines – Consists of all woody vines, regardless of height.

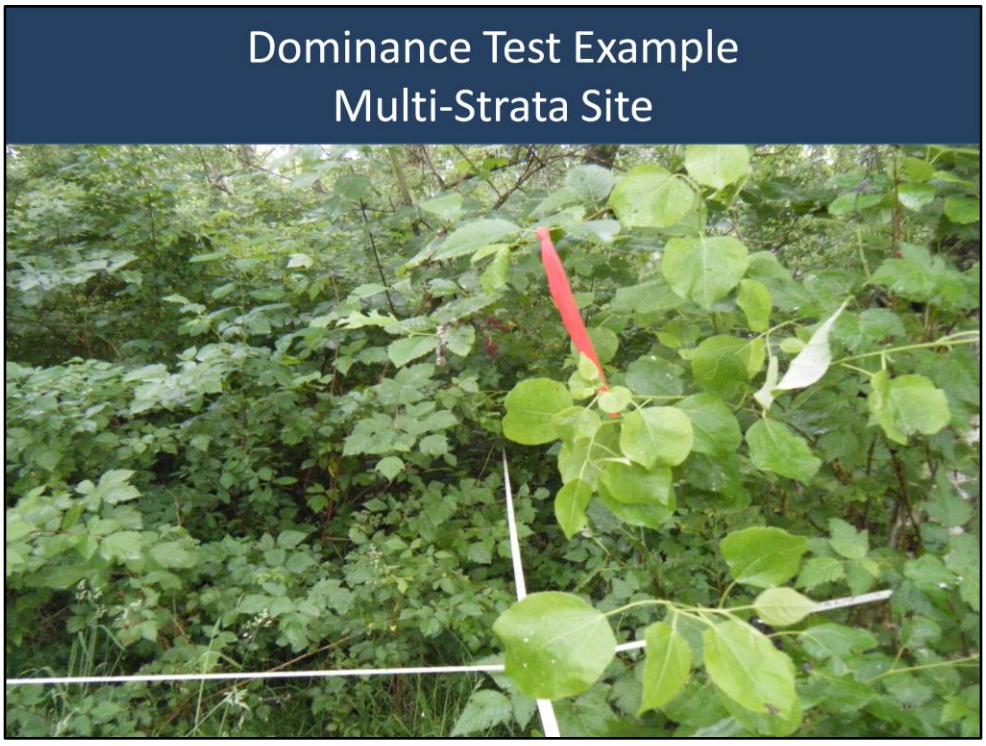


The dominance test is a more defined method. It is a procedure for selecting dominant plant species to determine if more than 50% of those dominant plant species across all strata are rated OBL, FACW, or FAC



The "50/20 rule" is the recommended method for selecting dominant species from the community when quantitative data are available. The rule is also useful to guide the visual selection of dominants for the Rapid Test too.

“For each stratum in the plant community, dominant species are the most abundant plant species (when ranked in descending order of abundance and cumulatively totaled) that immediately exceed 50 percent of the total cover for the stratum, plus any additional species that comprises 20 percent or more of the total cover of the stratum.”



Really only need to know / be able to identify the dominant species. I will go through a real example.

Dominance Test Example Using 50/20 Rule

For the Tree stratum:

Species Present	Indicator Status	% Cover
Alnus rubra	FAC	90 *
Populus tremuloides	FACU	20
Salix scouleriana	FAC	15
Acer macrophyllum	FACU	5
		130%

50% = 65%
20% =26%

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The selection of dominants is based on the total or absolute % cover rather than relative cover - in which the original data are adjusted so that they sum to 100%. In the WMVC regional supplement, absolute cover is recommended.

In this example, Alnus rubra is the only dominant in the tree stratum. It meets 50% and no other species meet or exceed the 20%.

For the sapling/shrub stratum:

Species Present	Indicator Status	% Cover
Cornus alba (sericea)	FACW	60 *
Rosa nutkana	FAC	15
Rubus spectabilis	FAC	10
Symphoricarpos albus	FACU	10
Oemleria cerasiformis	FACU	2
		97%

50% = 48.5%
20% =19.4%

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In this example from the shrub stratum, Cornus alba (red osier dogwood) is the only dominant. It exceeds 50%, and no other species meet the 20%

For the Herb stratum:

Species Present	Indicator Status	% Cover
Poa trivialis	FAC	25 *
Rubus ursinus	FACU	10 *
Ranunculus repens	FAC	5
Holcus lanatus	FAC	2
		42%

50% = 21%
20% =8.4%

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In this example from the herb stratum, Poa trivialis (a grass) meets and exceeds the 50% and Rubus ursinus (trailing blackberry) meets the 20%. So the herb stratum has 2 dominants. Here is how all of this should look on the field data form.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 10 m²)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	90	YES	FAC
2. Populus tremuloides	20	NO	FACU
3. Salix scouleriana	15	NO	FAC
4. Acer macrophyllum	5	NO	FACU
	130	= Total Cover	
Sapling/Shrub Stratum (Plot size: 10 m²)			
1. Cornus sericea/alba	60	YES	FACW
2. Rosa nutkana	15	NO	FAC
3. Rubus spectabilis	10	NO	FAC
4. Symphoricarpos albus	10	NO	FACU
5. Oemleria cerasiformis	2	NO	FACU
	97	= Total Cover	
Herb Stratum (Plot size: 10 m²)			
1. Poa trivialis	25	YES	FAC
2. Rubus ursinus	10	YES	FACU
3. Ranunculus repens	5	NO	FAC
4. Holcus lanatus	2	NO	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	42	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Wetland Non-Vascular Plants[1]

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. 105

From all strata there are 4 dominants, 3 of them are FAC or wetter. More than 50 percent of the dominant plant species across all strata are rated OBL, FACW, or FAC. This plot meets the dominance test hydrophytic vegetation indicator.

Taking a hydrology digression, the FAC Neutral test involves dropping any species with a FAC indicator status from the list dominants. If more than 50% of the remaining dominant species are FACW or OBL then the test is met and the plot meets the FAC-neutral test hydrology indicator. This example would not meet the FAC-neutral test.

When you review field data forms, make sure that the plot size is indicated. There is no rule for what the size should be. However, recommendations in the 1987 delineation manual are: Tree and woody vine strata – 30-foot radius; Sapling/shrub and herb strata – 5-foot radius. If it varies significantly from this, it should be noted on the form why the plot size was chosen, or you could ask why.

Prevalence Index

- Used when indicators of hydric soil and wetland hydrology **are present**, but vegetation fails the dominance test.
- Weighted-average wetland indicator status of all plant species in the plot
- To calculate, ≥80% of total vegetation cover in plot must be correctly identified and assigned wetland indicator statuses

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The third hydrophytic vegetation indicator should only be Used when indicators of hydric soil and wetland hydrology **are present**, but vegetation fails the dominance test.

The prevalence index is a Weighted-average based on the wetland indicator status of all plant species in the plot. You will see an example table on the next slide.

To apply the prevalence index, the investigators Need to know a lot more of the plants, to genus and species, not just the dominants. To calculate, at least 80% of the total vegetation cover in the plot must be correctly identified and assigned wetland indicator statuses.

Indicator Status	Species	Total % Cover by Indicator Status (A)	Times Multiplier = Product (B)
OBL	None	0	x 1 = 0
FACW	Cornus alba	60	x 2 = 120
FAC	Alnus rubra (90%) Salix scouleriana (15%) Rosa nutkana (15%) Rubus spectabilis (10%) Poa trivialis (25%) Ranunculus repens (5%) Holcus lanatus (2%)	162	x 3 = 486
FACU	Populus tremuloides (20%) Acer macrophyllum (5%) Symphoricarpos albus (10%) Oemleria cerasiformis (2%) Rubus ursinus (10%)	47	x 4 = 188
UPL	None	0	x 5 = 0
Sum		269	794

Prevalence Index = B/A =794/269 = 2.95
Prevalence Index $\leq$ 3 meets Hydrophytic Vegetation Indicator

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For the prevalence index, the strata does not matter just the total cover of all species that have a particular wetland indicator status.
This example does meet the prevalence index hydrophytic vegetation indicator because 2.95 is less than 3.

VEGETATION - Use scientific names of plants.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shurb Stratum			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum			
1. Reed canarygrass (Phalaris arundinacea)	20	Yes	FACW
2. Kenutcky bluegrass (Poa pratensis)	10	Yes	FAC
3. Colonial bentgrass (Agrostis capillaris)	10	Yes	FAC
4. Canada thistle (Cirsium arvense)	5	No	FAC
5.Unidentified Grasses	50	N/A	
6.			
7.			
8.			
9.			
10.			
11.			
	95	= Total Cover	
Woody Vine Stratum			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Remarks:

Dominance Test Worksheet:

Number of dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of dominant Species That are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL Species		x 1 =	0
FACW Species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = #DIV/0!

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet.
- ☐ 5 - Wetland Non-Vascular Plants[1]
- ☐ Problem Hydrophytic Vegetation (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? ☑ Yes ☐ No

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Here is another example, which shows some of the problems to look out for. Though it was determined to be hydrophytic vegetation, less than 50% of the vegetation cover of this plot has been identified. There is no way to know if it is one species of grass or 20 different ones.

Remember, the dominance test is **not** 50% of the *known* dominants and any other *known* species that provide 20% or more cover. You must list the plants that provide the most cover, even if you list them as grass 1, grass 2, and grass 3. If it turns out that grass 1 has 30% cover and is a dominant, then you need to identify it.

Depending on the time of year when the delineation is conducted, this could be a very common occurrence. Early spring is the best time of year to see and document hydrologic indicators (such as surface water, water table in a soil pit, or soil saturation). However, spring is generally not the best time of year to identify grasses, sedges, and other herbs.

Dominance Test BAD Example Using 50/20 Rule

For the Herb stratum:

Species Present	Indicator Status	% Cover
Phalaris arundinacea	FACW	20 *
Poa pratensis	FAC	10 *
Agrostis capillaris	FAC	10 *
Cirsium arvense	FAC	5
Unidentified Grasses	?	50
		95%

50% = 47.5%
20% = 19%

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In this example the yellow stars mark the 3 species that were determined to be dominants. But when their cover is added together it does not meet 50%. Adding all 4 known species would not meet 50%.

In this example, imagine if one of the unidentified grasses provided 30% cover and was later identified as Orchard Grass (Dacylis glomerata), which has an indicator status of FACU.

For the Herb stratum:

Species Present	Indicator Status	% Cover
Phalaris arundinacea	FACW	20 *
Poa pratensis	FAC	10
Agrostis capillaris	FAC	10
Cirsium arvense	FAC	5
Grass 1 – Dactylis glomerata	FACU	30 *
Unidentified Grasses	?	*20*
		95%

50% = 47.5%
20% = 19%

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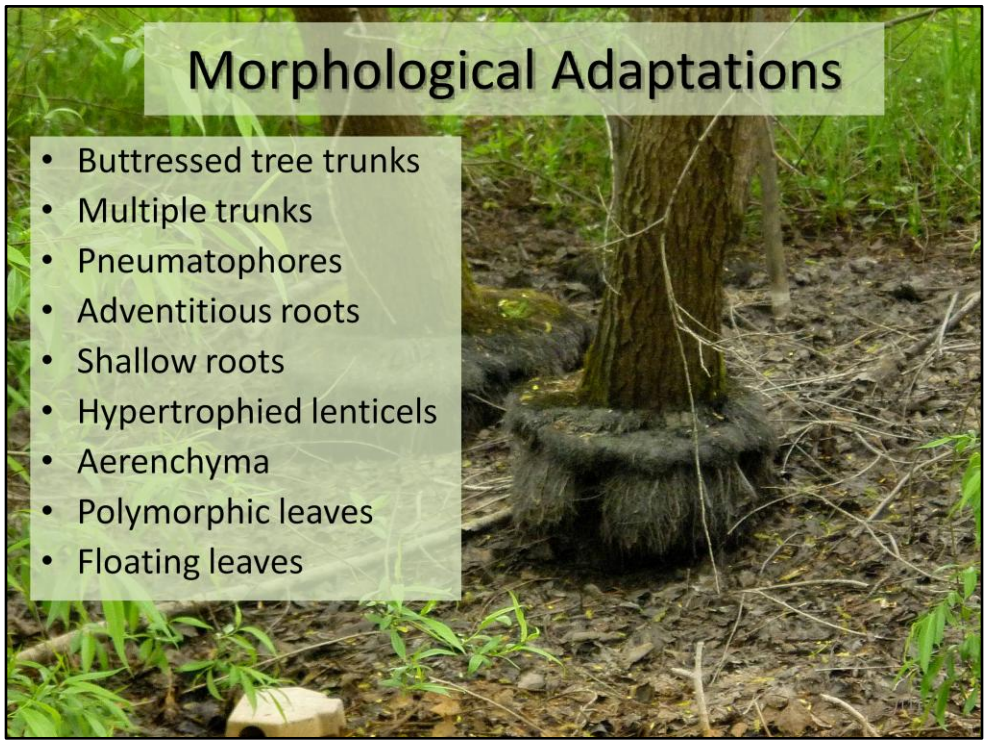
Your dominants would become Grass 1 and Phalaris. No other species meets the 20%. This plot would no longer meet the Dominance Test – it would no longer have greater than 50% of dominants being FAC or wetter plants. For the question, "Is hydrophytic vegetation present?" you would mark "NO" - Unless hydric soil and hydrology indicators are present in the plot in which case you would move on to the Prevalence Test. However remember to accurately calculate the Prevalence Test: at least 80% of the total vegetation cover in the plot must be correctly identified and assigned wetland indicator status



The 4th hydrophytic vegetation indicator is Morphological Adaptations. When morphological adaptations develop on FACU species growing in wetlands it indicates that those individuals are functioning as hydrophytes.
To apply this indicator one or more of these features must be observed on more than 50% of the individuals of a FACU species in an area (the sample plot) where hydric soils and hydrology are present. Only ones that you are likely to see are adventitious roots, shown here on these pacific willows and…

Procedure:
•Make sure the feature is not also present in the species in surrounding/adjacent non-wetland
•For the FACU up species with this feature estimate % of individuals that have it – record on data form
•If more than 50% of individuals in the species have the feature then that species is reassigned as FAC for that plot
•Record description of morphological adaptation and any other observations on the species growth habit, and include photo documentation
•Recalculate the dominance test or Prevalence index with the species as FAC. If either test meets the indicator then the plot meets the hydrophytic vegetation inidcator.

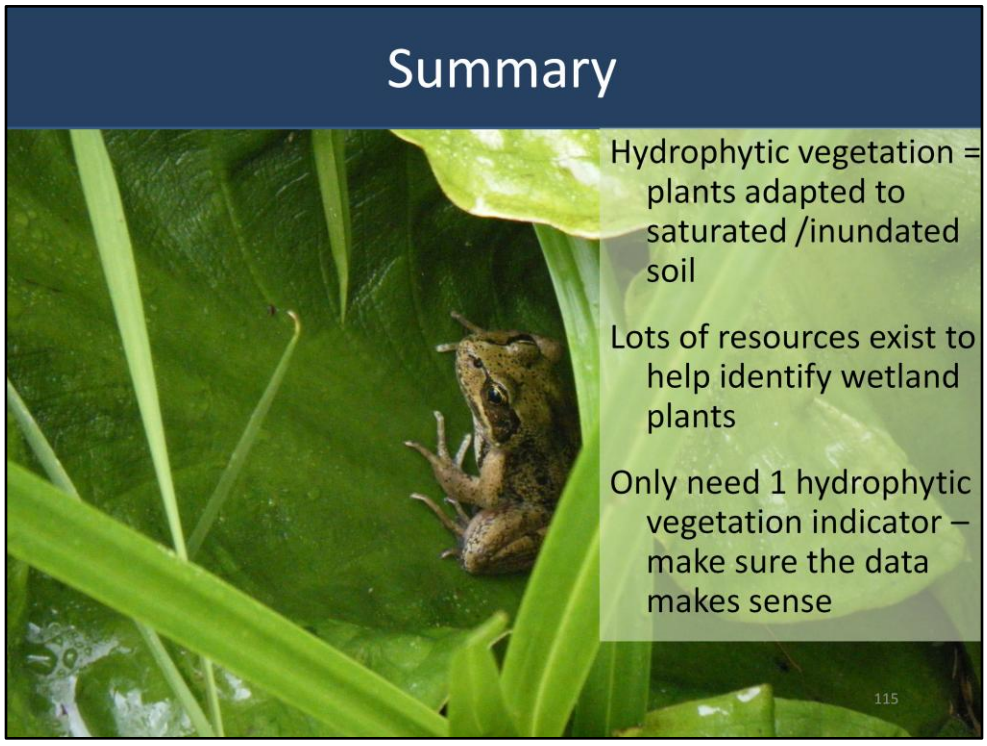
Buttressed tree trunks.

The 5th hydrophytic vegetation indicator is 'wetland non-vascular plants. Also called Bryophytes, these types of plants do not have true vascular tissue (xylem and phloem, lignin) that give other plants their form and structure. Non-vascular plants include mosses, hornworts, and liverworts. Bryophytes do not produce flowers or seeds; they reproduce via spores.

This indicator is based on the presence and abundance of a particular group of wetland-associated bryophytes that are found in forested wetlands, dominated by western hemlock (Tsuga heterophylla) in coastal Oregon and Washington. This indicator is Important for these sites because western hemlock has an indicator status of FACU, and unless there are documented morphological adaptations (indicator #4), a site dominated by hemlock may not meet the dominance or prevalence tests.

To meet this indicator the percent cover of wetland specific bryophytes must be more than 50% of the total cover of bryophytes in a sample plot (10 inches x 10 inches). This Does not include fungi or lichens. The WMVC supplement lists 7 species. However, it is very difficult to identify bryophytes. To get to the species level would probably require a microscope.


Questions?
114



While reviewing a wetland report, field data forms, or other site development information, if something does not seem right or if you suspect wetlands are present or a larger wetland is present, give us call. Technical assistance is part of our jobs.

Questions?

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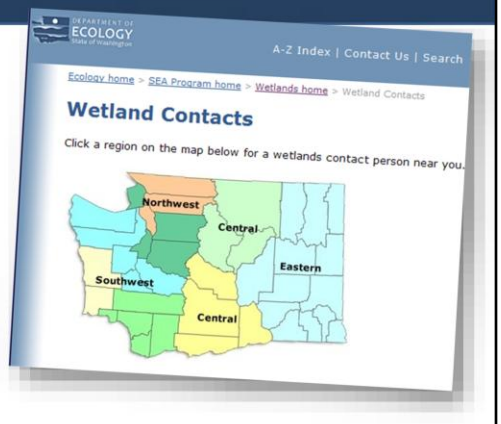
OR

Contact a regional wetlands specialist
http://www.ecy.wa.gov/programs/wetlands/contacts.htm



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